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TITLE: Assessing clinicians' knowledge and confidence to perform Kangaroo Care and Positive Touch in a Tertiary Neonatal Unit in England using the Neonatal Unit Clinician Assessment Tool (NUCAT)

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Abstract: (110-150 words)

Family centred care (FCC) is a guiding principle of the UNICEF Baby-Friendly Hospital Initiative (BFHI) and supports the practice of kangaroo care (KC) and positive touch (PT). We describe how clinicians in a tertiary hospital neonatal unit undertook a training needs analysis using the Neonatal Unit Clinician Assessment Tool (NUCAT), an on line knowledge test with ratings of confidence and knowledge in the practice of KC and PT. Fifty one medical and nursing staff completed NUCAT. Clinicians who spent 75% or more of their working week providing clinical care on the neonatal unit knew more about PT. Clinicians who received training in FCC practices had significantly more confidence in their knowledge and practice of KC and PT. Confidence in knowledge and practice in KC was significantly reduced when clinicians received their knowledge scores. There was no effect of feedback on confidence for PT. Interviews with six neonatal nurses identified a lack of formal training and evidence-based guidelines as impeding confidence of clinicians to implement both KC and PT.

Introduction

Infants admitted to Neonatal Intensive Care Units (NICUs) are deprived of physical contact at a time critical for the development of a close parent-infant relationship. Family centred care (FCC) is a guiding principle in the UNICEF Baby-Friendly Hospital Initiative (BFHI) and aims to ameliorate the trauma experienced by parents by supporting their role in the care of their baby (Nyqvist et al., 2012). Through supporting and educating parents in the practices of kangaroo care (KC) and positive touch (PT) neonatal staff can facilitate parental involvement, enhance the bonding process and minimise parental and infant distress (Hunt, 2008; Cleveland, 2008; Renfrew et al., 2009).

KC is described as skin-to-skin contact between a parent and their baby. A systematic review of interventions to promote or inhibit breastfeeding or breast milk feeding for infants admitted to NICUs found the additional practice of KC over routine care was associated with a higher breastfeeding rate, increased breast milk production, longer duration of lactation and an improvement in exclusivity of breast milk feeding both in hospital and post discharge (Renfrew et al., 2009). Amongst LBW infants, KC may have benefits compared to conventional neonatal care including increased likelihood of exclusive breastfeeding at discharge, reduced risk of nosocomial infection and severe illness, reduced risk of respiratory tract disease and an increased self-reported maternal competence (Conde-Agudelo and Belizan, 2003). However most of the studies within this review were conducted in low/middle income countries where the beneficial effects of KC on morbidity and mortality of LBW infants would be expected to be greatest.

PT is defined as 'involving various types of infant touch-interaction including handling, holding, kangaroo care and massage' (Bond, 2002). This term reflects the adapted style that is linked to a family centred, developmentally sensitive philosophy that can be utilized for the smallest of infants in the NICU. It is a practice that gives parents the opportunity to provide comforting touch and comfort holding, particularly during painful procedures. A review of preterm infant massage therapy studies found an association of infant massage with weight gain and shorter hospital stays (Field et al, 2010). However, despite these benefits, it was noted in an earlier survey of 90 NICUs in the USA, that preterm infant massage is only practised in 38% of NICUs and few studies

have been undertaken to provide an evidence base to support its practice (Field et al., 2004).

Despite the evidence for the benefits of KC as an intervention, two parent surveys in the UK have identified deficiencies in implementation. In 2011, The Picker Institute published a survey of over 9,000 parents' experiences (50% response rate) of care in 125 neonatal units in the UK and found that 77% of parents believed they were encouraged to touch, hold and comfort their baby, with just 5% reporting that this was not the case. However, a much smaller proportion of parents (50%) said that they had as much KC with their baby as they wanted. One in ten parents said that they did not know about KC. A significantly smaller proportion of the parents in the youngest age group (aged 16-27) reported being involved as much as they wanted to be in the day-to-day care of their babies, being encouraged to hold and comfort them and having as much kangaroo care with them as they wanted (Howell and Graham, 2011). The Poppy Report (2009) interviewed 55 parents of premature babies in England and Scotland and identified a lack of parent engagement in KC.

Several international studies of staff attitudes to KC have shown that this practice is strongly supported in NICUs (Engler et al., 2002;Chia et al., 2006; Valizadeh et al., 2013). However, barriers to implementing KC include heavy staff workloads, insufficient education or experience, lack of organizational support and absence of clear protocols, especially for LBW infants (Engler et al., 2002; Charpak and Ruiz-Paláez, 2005; Chia et al., 2006; Johnson, 2007; Nirmala, Rheka and Washington, 2006; Hardy, 2011; Lee et al., 2012; Stikes and Barbier, 2012). The need for professional development and education along with supervised practice has been noted in previous studies (Flynn and Leahy-Warren 2010; Chia et al., 2006). There are few studies that have evaluated training interventions to support the practice of KC and PT. One study in New York assessed the impact of a simulation-based training program on 30 nurses' attitudes towards and competency in KC, and found that both significantly improved after training (Hendricks-Munoz and Mayer (2010). An earlier study by Stikes and Barbier (2013) in Louisville (USA) aimed to increase the rate of participation in KC in NICU through introducing a Plan-Do-Study-Act quality improvement model, developed by Shewart and Deming (Deming 1994). Education was planned, surveys were developed and strategies implemented to overcome barriers and this resulted an increase in the use of KC by 31% over a four-month timeframe.

The current study provides the first objective assessment and feedback of knowledge and confidence in knowledge and practice of KC and PT. Using a test of factual knowledge it enables the NICU to assess the training needs of staff, whilst subjective assessment is used to measure the confidence of staff in their knowledge and practice. Knowledge plays a key role in the implementation of KC and PT but staff also need to feel confident in their practice. Self-efficacy can be seen as self-confidence in a specific situation and is defined by Bandura (1986) as the "belief in one's capabilities to organize and execute the sources of action required to manage prospective situations" (p. 389). This is directly related to an individual's belief in their ability to perform a task, the more confident they feel the more likely they are to perform the practice (Bandura, 1997). The aims of the current study are to report from the same sample of staff:

1. Objectively assessed knowledge of KC and PT and how it differs by job type, prior experience and training.

2. Subjectively assessed confidence in knowledge and practice of KC and PT, and how it differs by job type, prior experience and training.

3. Associations between objectively assessed knowledge and subjectively assessed confidence in knowledge and practice.

4. Changes in confidence in knowledge and practice of KC and PT as result of clinicians completing an objective knowledge test and receiving feedback on their individual scores.

5. The opinions and experiences of a range of clinicians in relation to KC and PT training and delivery on NICU.

METHOD

Setting

The Neonatal unit in University Hospitals Coventry and Warwickshire NHS Trust is a tertiary centre in England with around 650 admissions per year and approximately 100 clinical staff.

The study was approved by Coventry University Ethics Committee and the Research Governance team of the NHS Trust.

Measures

The Neonatal Unit Clinical Assessment Tool (NUCAT) is a new method of assessing clinicians' knowledge and confidence in skills that support breastfeeding practices and engage parents in the care of their baby in NICUs. NUCAT was commissioned by the child health charity Best Beginnings and developed by Coventry University's Health Behaviour Research Limited as part of a larger evaluation of the Small Wonders Change Programme (Farnworth and Baum, 2012). The knowledge areas within NUCAT have several items to create coverage of key topics: PT, KC, Breast Milk Expression, Physiology of Lactation, Breastfeeding Practices and the Benefits of Breastfeeding. We report here the results from the knowledge areas of KC and PT, the results of breastfeeding practices have been reported previously (Wallace et al., 2013).

NUCAT in the form used in this study consisted of an on-line survey with 11 personal descriptive questions covering gender, job type, working time in NICU (both years of experience and percentage of working week) and recent, relevant training. There are 8 confidence items covering confidence in knowledge and confidence in practice, related to the topics assessed in the knowledge section. Rating scales are from 1 (*No confidence/knowledge*) to 10 (*Very confident/knowledgeable*). Knowledge was assessed with 5 items related to PT and 10 related to KC, where only one of four response options is correct. Questions cover factual knowledge as well as observation of clinical scenarios (using still clinical photographs and video clips). Feedback of the percentage of correct scores in each sub section and in total is provided to individuals via the web site after completion of the assessment.

Procedure:

All clinical staff on the unit were invited to take part in the study. Those who agreed to take part received an e-mail invitation to complete NUCAT along with a participant information sheet and consent form. They were then sent a password and link to access the on line test.

NUCAT Test

Clinicians were asked to rate their knowledge and confidence in practices to support KC and PT both before and after their knowledge was assessed and their scores provided to them personally. Planned analyses of the NUCAT results were descriptive statistics, difference statistics (t-tests or one way ANOVAs) and multiple linear regression for establishing differences in knowledge and confidence ratings by personal descriptive variables.

Paired t-tests compared knowledge and confidence ratings pre-post feedback.

Interviews

Aim: To explore the views of clinicians about the practices of KC and PT we undertook semi structured interviews.

Procedure: Participants who had completed NUCAT were invited to undertake an interview in work time. Clinicians were approached by the research nurse (WH) to be interviewed once they had completed NUCAT. They were given the option to discuss either KC or PT in depth.

A contemporary theory of implementation science, known as normalisation process theory (NPT) (May et al., 2009) was used as a framework to explore both the promoters and barriers of KC and PT in clinical practice and focused on three areas:

1. How KC and PT affect interactions of clinicians with parents
2. How well clinicians are trained to support KC and PT
3. How far KC and PT are supported by polices and clinicians' availability

Sample:

Purposive sampling was used to gain coverage of different job types and ensure a breadth of staff knowledge and experience regarding the practices. The interview sample (n=6) consisted of four neonatal nurses, an Advanced Neonatal Nurse Practitioner (ANNP) and a nursery nurse. The range of NICU experience in the sample varied from 3 months to 36 years. The staff interviewed for KC were one staff nurse, two experienced senior nurses and an ANNP. Of the four interviewed only one had received formal training in KC. One newly qualified staff nurse and a very experienced nursery nurse chose to discuss PT. Of the two staff interviewed, one had received formal training on PT and the other had picked up information on the unit through informal education.

Analyses were conducted using thematic analysis for a priori themes (Ward, 2013).

RESULTS

Who completed NUCAT

Of an approximate workforce of 100 clinicians, 51 completed NUCAT. The sample reflected the overall mix of the unit including medical/ANNPs (17%, n=9) nursery

nurses (11%, n=6), and neonatal nurses (70%, n=36). Most 90.2%, (N=47) were women, with a spread of ages and experience since qualification in neonatal care (see Table 1). Less than half of those who undertook NUCAT (45%, n=23) said that they had received training in kangaroo care, 31% (n=16) had been trained in positive touch and 7% (n=4) trained in baby massage. The majority (52%, n=27) had had no formal training in parent centred neonatal care (excluding breastfeeding support). Most clinicians (86%, n=44) spent at least 75% or more of their working week directly caring for babies and parents in the neonatal unit.

NUCAT knowledge scores

Table 1 also shows the knowledge scores by demographic and job variables. Knowledge scores for KC showed that 96% (n=49) of clinicians scored >50% correct, half (n=25) of whom scored >75% correct. Knowledge of PT was higher than KC, with 74% (n=38) of clinicians scoring >75% correct. However, 2 clinicians scored <25%, i.e. below chance levels. Knowledge of KC did not differ with job type, age, length of time working on NICU, percentage of time spent in direct care of babies or training in parent centred neonatal care (PCNC), KC or PT. Linear regression analyses of job type, age, length of time working on NICU, percentage of time spent in direct care of babies and PCNC training on knowledge in KC, did not provide a significant model [$F, (5,45=0.09)$ $p=0.10$]. Knowledge of PT did not differ by job type, age, length of time working on NICU, or FCC training. One-way ANOVA showed that those clinicians who spent 75% or more of their working week providing direct care for babies scored significantly more correct for PT than those who spent less than 75% of their time in direct care of babies on the unit. Linear regression analyses including job type, age, length of time working on NICU, percentage of time spent in direct care of babies and training in PCNC explained 25% of the variance in knowledge in PT [$F, (5,45=2.93)$ $p=0.02$]. Spending more than 75% of time in direct care of babies (Beta 0.46, $t=3.28$, $p<0.01$) was a unique predictor of knowledge in PT.

Confidence in Knowledge

Baseline ratings for confidence in knowledge of KC did not differ by job type, age, length of time working on NICU or percentage of time spent in direct care of babies (see Table 2). However, confidence in knowledge of KC was significantly lower in those who had not received training in PCNC, KC and PT. Linear regression analyses including job type, age, length of time working on NICU, time spent in direct care of babies and PCNC training explained 32% of the variance in confidence in knowledge of KC [$F, (5,45=4.27)$

p<0.01]. Training in PCNC practices (Beta=0.33, t=2.47 p=0.02) was a unique predictor of confidence in knowledge of KC.

Baseline ratings of confidence in knowledge of PT did not differ by job type or percentage of time spent in direct care of babies. However, clinicians in the younger age group (20-39 years), who had worked on NICU for <2years or who had not received training in PCNC, KC and PT rated their confidence significantly lower (Table 2). Linear regression analyses including job type, age, length of time working on NICU, percentage of time spent in direct care of babies and PCNC training explained 23% of the variance in confidence in knowledge in PT [F, (5,45=2.73) p=0.03] although there were no significant unique predictors.

Confidence in Practice

Baseline ratings for confidence in practice of KC did not differ with job type, age or length of time working on NICU but confidence in the practice of KC was significantly lower in clinicians who spent <75% in direct care of babies and who had not received training in PCNC, KC and PT (See Table 3). Linear regression analyses including job type, age, length of time working on NICU, time spent in direct care of babies and PCNC training explained 38% of the variance in confidence in practice in KC [F, (5,45=5.42) p<0.01]. Training in PCNC (Beta=0.57, t=0.28 p=0.04), and spending more than 75% of time in direct care of babies (Beta=0.35, t=2.74 p=0.01) were unique predictors of confidence in practice of KC.

Confidence in practice of PT did not differ with job type or percentage of time spent in direct care of babies but ratings were significantly lower in the younger age group (20-39), those who had worked < 5 years on NICU and those who had not received training in PCNC, KC and PT. Linear regression analyses including job type, age, length of time working on NICU, percentage of time spent in direct care of babies and PCNC training explained 28% of the variance in confidence in practice in PT [F, (5,45=3.46) p=0.01] although there were no significant unique predictors.

The effect of feedback of knowledge scores on confidence

Statistical analyses (t tests) were used to test for differences in the confidence sub scale scores before and after receiving feedback of knowledge scores (see Table 4). The range of scores and standard deviations when measuring confidence in knowledge and practice showed considerable variability within the sample, and there was no evidence of a "ceiling effect", whereby all clinicians were already very confident. After receiving

feedback, clinicians on average experienced a statistically significant decrease in confidence in their knowledge of KC ($t(50)=4.26$, $p<0.001$), and also in their confidence in their practice to support KC ($t(50)=3.27$, $p<0.01$). PT was an area in which clinicians had moderately high ratings of their knowledge and confidence in their practice pre-test and their ratings of knowledge and confidence in practice after receiving feedback did not reduce significantly.

INTERVIEWS

Kangaroo Care Interviews

'KC builds rapport between staff and parents'

When staff were asked how performing KC affected staff interactions with parents a theme to emerge was that providing KC helped to build rapport between staff and parents. Clinicians recognised that encouraging parents to perform KC engendered a positive response that eased communication and helped to build a trusting relationship between them. It was felt that parents appreciated the time that staff spent supporting them with this practice and that this in turn gave them options to talk about other aspects of caregiving:

> They are really grateful… they relax so much when they have the babies close to them, you just see the whole worry and stress goes from their faces and they're just calm. I think it gives you an option to talk to them on a relaxed level. (Sister, 11 years experience)

'Lack of parental confidence and knowledge in providing KC'

A second emergent theme was the lack of parental understanding of the availability of KC, which impacted their confidence to request it. Staff described a lack of knowledge amongst parents. It was believed that by clinicians giving the practice of KC greater priority and normalising it within the unit culture, parents could become empowered and thereby increase their own confidence in providing this care for their baby:

> I don't think parents know enough about it to be honest because they don't generally request it a lot. (Staff Nurse, 3 years experience)

Staff felt that, in general, parents were keen to undertake KC but it was noted that some might feel inhibited in this practice.

> Some are very forward and some are quite against KC, it might be cultural… to put the baby onto the naked chest of the mother or father, that might be a little bit of a problem for them. (Sister, 9 years experience)

'Staff were positive about the importance of providing KC'

Another emergent theme was the positive approach that staff showed towards KC. They described both physiological benefits to the baby and psychological benefits to parents in providing this practice and seemed extremely positive and convinced through their practice about its benefits. They particularly focused on the way in which KC can help to provide much needed contact and bonding with the baby:

> KC can only be a positive… it is really important for them to take ownership of their baby and be empowered… it gives them important bonding time. (Sister, 9 years experience)

'Staff lacked training and education '

When clinicians were questioned about the training they had received a theme to emerge was lack of evidence-based knowledge, which was believed to prevent staff from initiating KC with parents. Fear of undertaking KC emerged as an inhibiting factor along with finding the time needed to support KC:

> We could do KC more often - we don't due to lack of knowledge and knowing the benefits of it. Also maybe fear and the time it takes. (Sister, 11 years experience)

None of the staff interviewed were aware of any unit guidance or policies relating to KC. It was also recognised that guidelines and education would enable the unit to develop a culture that would promote kangaroo care:

> If there was something in place and being taught on the neonatal intensive care course this would be something most nurses would adapt to a bit more. (ANNP, 23 years experience)

'The importance of gaining confidence through training and experience'

The importance of gaining confidence through both training and experience was an emergent theme, and fear and inexperience were inhibiting factors. It was felt that a degree of misunderstanding about the way in which KC could be used led to some

confusion about what could be considered appropriate handling of the baby and this may limit its practice:

> I think they might see it as increased workload and that might be a hindrance to them to do it or they are just scared or inexperienced junior nurses. (Sister, 9 years experience)

'Lack of staff availability and resources'

The importance of staff availability to supervise junior staff in order that they can both provide KC and also so that junior staff are given the opportunity to build their confidence through supported practice was noted. Also, the lack of comfortable chairs was identified as hindering the delivery of safe and effective KC:

> At times there is the manpower… but if there are just a couple of inexperienced nurses they can't supervise so that's a very difficult issue. (Sister, 9 years experience)

Interviews about Positive Touch

'Positive touch improves parent confidence in their caring role and in the staff'

When questioned about how practicing PT affects interactions with parents a theme to emerge from the analyses was the way in which PT improves parents' confidence in looking after their baby and also their confidence in the nursing staff.

> If the parents can see that you can settle them quite easily… then I think it makes them have more confidence in you really. (Staff Nurse, 3 months experience)

It is also a way in which staff and parents can discuss the care of their child in a positive way, because it is equipping parents with the skills to comfort their sick baby. PT was identified as a skill that parents were enthusiastic about and it was recognised that it could be a beneficial practice to perform post-discharge:

> Parents learn these things and they can use them when they actually go home as well sometimes… they know they can take that home with them, it's not just in hospital. (Staff Nurse, 3 months experience)

'Staff are keen to learn about PT '

PT was not recognised as routine practice but a theme to emerge was that staff were keen to learn about it, and the member of staff who had received training felt that there was enthusiasm for training and education:

> PT is not something we do routinely on the unit so they don't know much about it, all they know is what they have read but once you tell them about it then they all want to do it, they are all very keen to do it. (Nursery Nurse, 36 years experience)

Despite the lack of training, the member of staff with no PT training felt fairly confident in practicing it because of the positive effect it had on the babies. With regards evidence-based practice, the trained member of staff identified some benefits of positive touch and discussed improvement outcomes:

> Babies going home earlier, less stressful for babies… just better for the babies developmentally. (Nursery Nurse, 36 years experience)

'Lack of guidelines and robust evidence-base for PT inhibits practice'

When both clinicians were questioned about the training they had received a theme to emerge was the lack of guidelines and robust evidence-base for PT and the way that this inhibits practice.

> I do feel that we muddle through… we are not really doing what we should be doing. (Nursery Nurse, 36 years experience)

DISCUSSION:

Main findings:

Over half of the clinicians that undertook NUCAT had no formal training in PCNC, KC or PT yet they demonstrated good levels of knowledge in KC and PT. Those clinicians who spent more clinical time working on the unit gained the highest knowledge scores in PT, suggesting a clinical, hands-on role improves knowledge. However, although a majority of clinicians scored well in knowledge in both areas, training had a significant impact on their confidence in both their knowledge and practice of PT and KC. Confidence in knowledge and practice was significantly less if clinicians had not received PCNC, KC or PT training suggesting that training helped to improve confidence. Those clinicians in the younger age group (20-39 years) or those who had worked on the unit for <5 years

also had significantly lower confidence in their knowledge and practice of PT. PT as a practice is difficult to define and has a poor evidence base, but these results suggest that experienced clinicians feel more confident supporting this practice.

Clinicians' ratings of their knowledge and confidence to practice KC were significantly reduced by receiving their knowledge scores. Clinicians commented informally that having feedback in the percentage of correct answers gave information of value to clinicians in raising their awareness of areas for development. The results of the interviews showed that confidence in practice, along with a lack of evidenced based knowledge, is recognised as a factor that may inhibit the provision of KC. The reluctance to perform KC may be causally linked to the lack of clear guidance and formal training. These findings are similar to Flynn and Leahy-Warren (2010) which showed neonatal nurses had a good knowledge of the beneficial effects of KC, though none had received formal training or education. In their study, the lack of training meant that clinicians were not fully informed regarding the suitability of some preterm infants to participate in KC and this led to constraints within practice. The results of both studies suggest that clearer guidelines and formal training could help clinicians to appropriately select infants who could benefit from KC. Further studies to explore the benefits and limitations of KC would serve to support the development of these guidelines.

The feedback of knowledge scores did not significantly reduce clinicians' ratings of their confidence in their knowledge and confidence to practice PT. This may reflect the fact that the feedback was generally in line with their own assessment, and therefore did not challenge their self-ratings. Also, it must be noted there were only 5 knowledge items for PT which may have meant that clinicians did not feel their knowledge was as rigorously tested as for KC.

Whilst clinician confidence is key in enabling the implementation KC and PT, confidence is also an important factor in the parents' ability to care for their baby. Clinicians interviewed in this study described the central role that these practices play in both improving the bonding between parent and child but also encouraging good relations with clinicians. It is recognised that parents within this healthcare setting find themselves in a position of vulnerability and not always confident in directing what they may believe to be the best care for their baby (Renfrew et al., 2010; Lemmen et al., 2013), as a result it is even more important that the neonatal clinician acts as an advocate to both provide comprehensive evidence-based information for the practices, and practical support for their implementation through engendering confidence in the

parents. A study undertaken in three hospitals in southern Sweden describes how parents believed they would have demanded to provide KC more regularly if they had been better informed of the evidence base to support it (Lemmen et al. 2013). The UK charities BLISS and Best Beginnings provide information to support parents of NICU babies and have collaboratively introduced KC stickers which are placed on a chart as a visual method of both prompting clinicians to offer and encourage parents to ask for KC and also keep track of which babies have received KC, but this intervention has not yet been evaluated.

Training in PT and KC could be supported by a combination of short fact-based approaches that may be effectively imparted by e learning modules. Training sessions need to be both theoretical and practical, and should be made available to all clinicians with an emphasis on evidence-based information providing a strong justification for this practice and clear information on how to educate parents (Bergh et al., 2012; Nirmala et al., 2006). The role of on-site developmental care specialists in providing education and support has been shown to improve clinicians' beliefs related to the effective areas of FCC and the practice of KC (Hendricks-Munoz et al., 2010). Guidelines and policies relating to KC and PT have been shown to be effective in increasing breastfeeding rates when introduced to NICU (Renfrew et al., 2009). Barriers to providing KC, such as a lack of sufficient numbers of trained clinicians, insufficient education and lack of clear protocols have been identified in our study and concur with findings from an Australian survey of NICU nurses in Melbourne, Australia (Chia et al., 2006).

Our study confirms findings of others in the US, (Engler et al., 2001), Australia, (Chia et al., 2006) and Iran, (Valizadeh et al., 2013) that indicate nurses are keen to implement KC. Incorporating interdisciplinary and multidisciplinary team approaches to education would augment the implementation of KC and PT into every day practice. By raising the profile of the practices through formal training it is possible to engender a culture in NICUs that promotes and encourages it and delivers safe practice. Future studies could be undertaken to evaluate the KC and PT education and training programmes that neonatal units currently offer, in order to ascertain their effectiveness.

Limitations of the study:

Just over half the clinical staff of the unit undertook NUCAT and they are in similar proportions by job type to those who did not. We have a reasonable justification for suggesting their knowledge and confidence scores are likely to be representative of all the different professions working on the unit, but we cannot be sure of this without a

larger sample being tested. Similarly, those who agreed to be interviewed may have had more positive views about the topics than those who did not volunteer. These caveats lead us to suggest our analysis may give conservative estimates of training needs.

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Table 1 Knowledge Scores for KC and PT by Demographic and Job Type Variables.

			Kangaroo Care (max score=10)			Positive Touch (max score=5)		
Descriptive	Range	n	mean	sd	anova	mean	sd	anova
Job type	Doctors/ANNP	9	7.22	1.39	F(2,48)=0.19, p=0.83	3.67	1.00	F(2,48)=1.07, p=0.35
	Neonatal nurses	36	7.47	1.46		3.89	0.62	
	Nursery nurse	6	7.67	1.03		3.33	1.86	
Age range in years	20-39	33	7.40	1.50	F(1,49)=0.16 p=0.70	3.88	0.65	F(1,49)=1.03 p=0.32
	39-59	18	7.56	1.20		3.61	1.24	
Length of time working on NICU	0 -5 years	30	7.40	1.57	F(1,49)=0.10 p=0.76	3.93	0.64	F(1,49)=2.03 p=0.16
	> 5 years	21	7.52	1.12		3.56	1.16	
Time spent in direct care of babies	less than 75%	7	7.43	1.51	F(1,49)=0.02, p=0.96	2.71	1.11	F(1,49)=14.53, p<0.001
	75% or more	44	7.45	1.39		3.95	0.75	
Training in parent centered neonatal care	Yes	24	7.37	1.31	F(1,49)=0.13, p=0.72	3.87	0.90	F(1,49)=0.45, p=0.50
	No	27	7.51	1.48		3.70	0.91	
Received Training in KC	Yes	23	7.39	1.34	F(1,49)=0.76 p=0.78	3.87	0.99	F(1,49)=0.37 p=0.55
	No	28	7.50	1.45		3.71	0.90	
Received Training in PT	Yes	16	7.43	1.50	F(1,49)=0.00 p=0.96	4.0	0.63	F(1,49)=1.34 p=0.52
	No	35	7.45	1.35		3.67	0.99	

Table 2 Confidence in Knowledge by Demographic and Job Type Variables.

Confidence in Knowledge Table			Kangaroo Care (max score=10)			Positive Touch (max score=5)		
Descriptive	Range	n	mean	sd	anova	mean	sd	anova
Job type	Doctors/ANNP	9	5.56	2.83	F(2,48)=2.40 p=0.10	5.22	2.39	F(2,48)=0.82 p=0.45
	Neonatal nurses	36	7.03	1.93		5.78	2.14	
	Nursery nurse	6	7.67	1.21		6.67	2.13	
Age range in years	20-39	33	6.45	2.22	F(1,49)=3.32 p=0.08	5.33	2.15	F(1,49)=4.49 p=0.04
	39-59	18	7.56	1.72		6.61	1.89	
Length of time working on NICU	0 - 5years	30	6.57	2.16	F(1,49)=1.26 p=0.27	5.20	2.17	F(1,49)=6.04 p=0.02
	> 5 years	21	7.24	2.02		6.62	1.80	
Time spent in direct care of babies	less than 75%	7	5.29	2.14	F(1,49)=4.75 p=0.34	5.29	1.70	F(1,49)=0.44 p=0.51
	75% or more	44	7.09	2.02		5.86	2.20	
Training in parent centred neonatal care	Yes	24	7.88	1.48	F(1,49)=13.56 p<0.01	6.75	1.90	F(1,49)=11.24 p<0.01
	No	27	5.93	2.18		5.93	1.97	
Received Training in KC	Yes	23	7.78	1.45	F(1,49)=9.75 p<0.01	6.70	1.92	F(1,49)=8.89 p<0.01
	No	28	6.07	2.28		5.04	2.03	
Received Training in PT	Yes	16	7.88	1.20	F(1,49)=4.04 p=0.02	7.00	1.67	F(1,49)=8.79 p<0.01
	No	35	6.37	2.28		5.23	2.10	

Table 3 Confidence in Practice by Demographic and Job Type Variables.

Confidence in Practice			Kangaroo Care (range 1-10)			Positive Touch (range 1-10)		
Descriptive	Range	n	mean	sd	anova	mean	sd	anova
Job type	Doctors/ANNP	9	5.22	2.86	F(2,48)=3.36 p=0.04	5.33	2.45	F(2,48)=0.95 p=0.39
	Neonatal nurses	36	7.25	2.08		5.81	2.07	
	Nursery nurse	6	7.50	1.52		6.83	1.47	
Age range in years	20-39	33	6.58	2.30	F(1,49)=2.21 p=0.14	5.27	2.00	F(1,49)=8.00 p=0.01
	39-59	18	7.56	2.21		6.89	1.84	
Length of time working on NICU	0 - 5 years	30	6.77	2.32	F(1,49)=0.33 p=0.57	5.27	2.08	F(1,49)=6.16 p=0.02
	> 5 years	21	7.14	2.27		6.67	1.83	
Time spent in direct care of babies	less than 75%	7	4.57	1.81	F(1,49)=10.22 p<0.01	5.14	1.46	F(1,49)=0.92 p=0.34
	75% or more	44	7.30	2.13		5.95	2.16	
Training parent centred neonatal care	Yes	24	7.96	1.65	F(1,49)=11.32 p<0.01	6.83	1.71	F(1,49)=12.64 p<0.01
	No	27	6.00	2.39		4.96	2.01	
Received Training in KC	Yes	23	7.78	1.45	F(1,49)=9.75 p<0.01	6.78	1.73	F(1,49)=10.08 p<0.01
	No	28	6.07	2.28		5.07	2.05	
Received Training in PT	Yes	16	8.19	1.05	F(1,49)=8.24 p<0.01	7.00	1.41	F(1,49)=8.24 p<0.01
	No	35	6.34	2.46		5.31	2.13	

Table 4 Correlations Between Knowledge Score and Confidence in Knowledge and Practice

		Confidence in Knowledge	Confidence in Practice
Knowledge score	Kangaroo Care	r= 0.17(p=0.24)	r= 0.17(p=0.25)
	Positive Touch	r=0.22(p=0.13)	r= 0.21(p=0.15)

Table 5 Clinicians' ratings of their confidence in knowledge and practice to support PT and KC pre and post feedback of knowledge score

Item	Confidence Score						
	Range	Pre-Test Mean	SD	Range	Post-Test Mean	SD	t test
Confidence in Knowledge of positive touch for sick and premature babies	1-10	5.78	2.13	1-10	5.69	1.89	t(50)=0.55, p=0.59
Confidence in practice of positive touch for sick and premature babies	1-10	5.84	2.08	1-10	5.78	2.04	t(50)=0.36, p=0.72
Confidence in knowledge of Kangaroo Care	1-10	6.84	2.11	1-10	6.06	1.90	t(50)=4.26, p<0.001
Confidence in practice of Kangaroo Care	1-10	6.92	2.27	1-10	6.27	2.02	t(50)=3.27, p<0.01